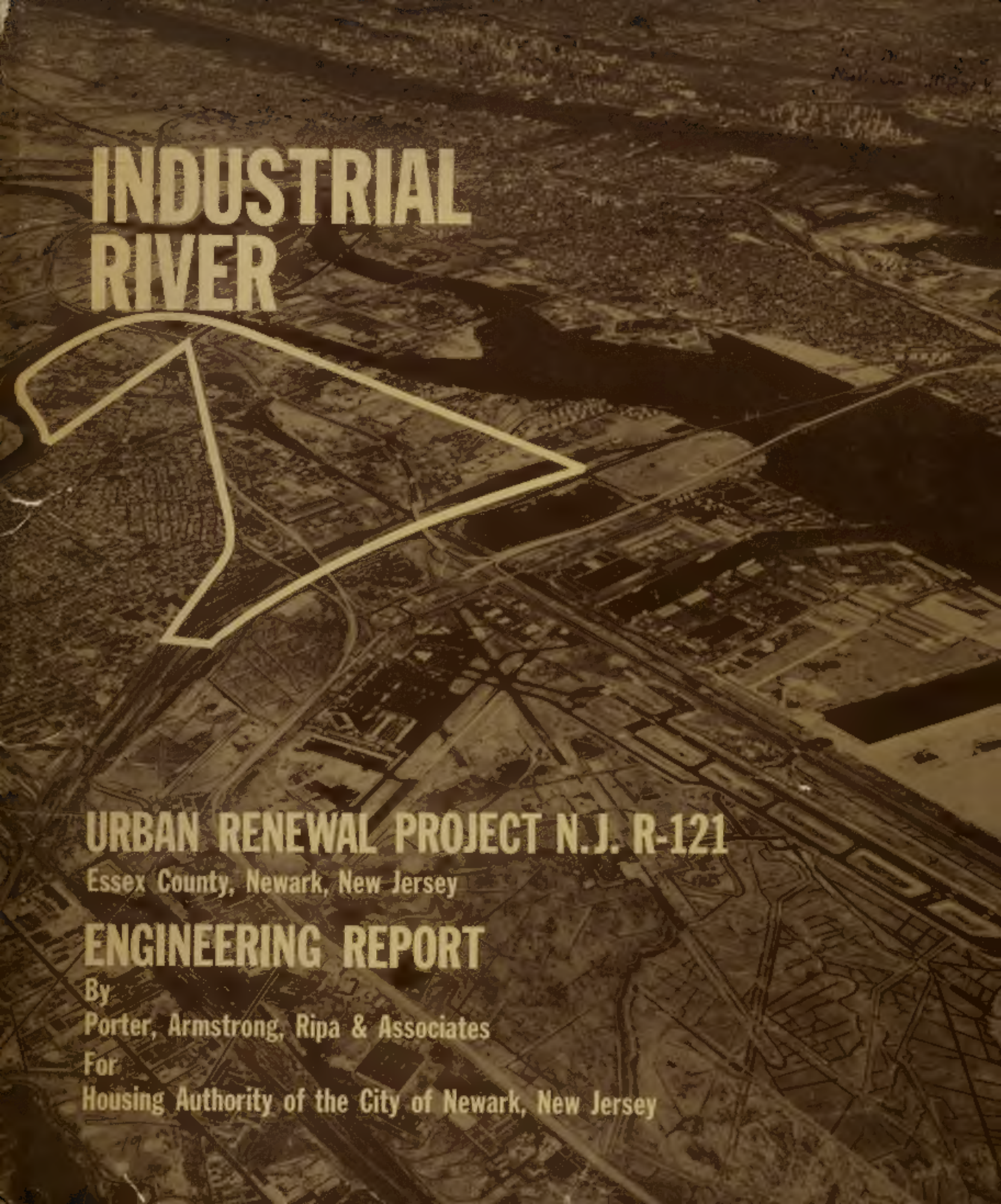

INDUSTRIAL RIVER

URBAN RENEWAL PROJECT N.J. R-121

Essex County, Newark, New Jersey

ENGINEERING REPORT

By

Porter, Armstrong, Ripa & Associates

For

Housing Authority of the City of Newark, New Jersey

PORTER | ARMSTRONG | RIPA & ASSOCIATES

Newark – Housing Authority

c. 1965

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The Project

The Industrial River Urban Renewal Project involves the development, renewal, and rehabilitation of approximately 1700 acres of land on the eastern edge of the City of Newark. The project is under the direction and control of the Housing Authority which is the Redevelopment Agency for the City of Newark; and it is federally sponsored by the Urban Renewal Administration of the Housing and Home Finance Agency under the Housing and Urban Development Act of 1965 [Housing Act of 1949, as Amended]. The Passaic River bounds the area on the north; Doremus Avenue on the east; the Pennsylvania Railroad line, Pulaski Skyway and Raymond Boulevard on the west; and the Pennsylvania and Lehigh Valley Railroad yards and tracks on the south.

The project is considered to be prime industrial land because of its central location in the metropolitan area; the large labor market — professional, skilled and unskilled — that it can freely draw upon; its strategic location as a central assembly and distribution hub for the metropolitan market area and the whole eastern seaboard; and the complete utility service and transportation facilities available.

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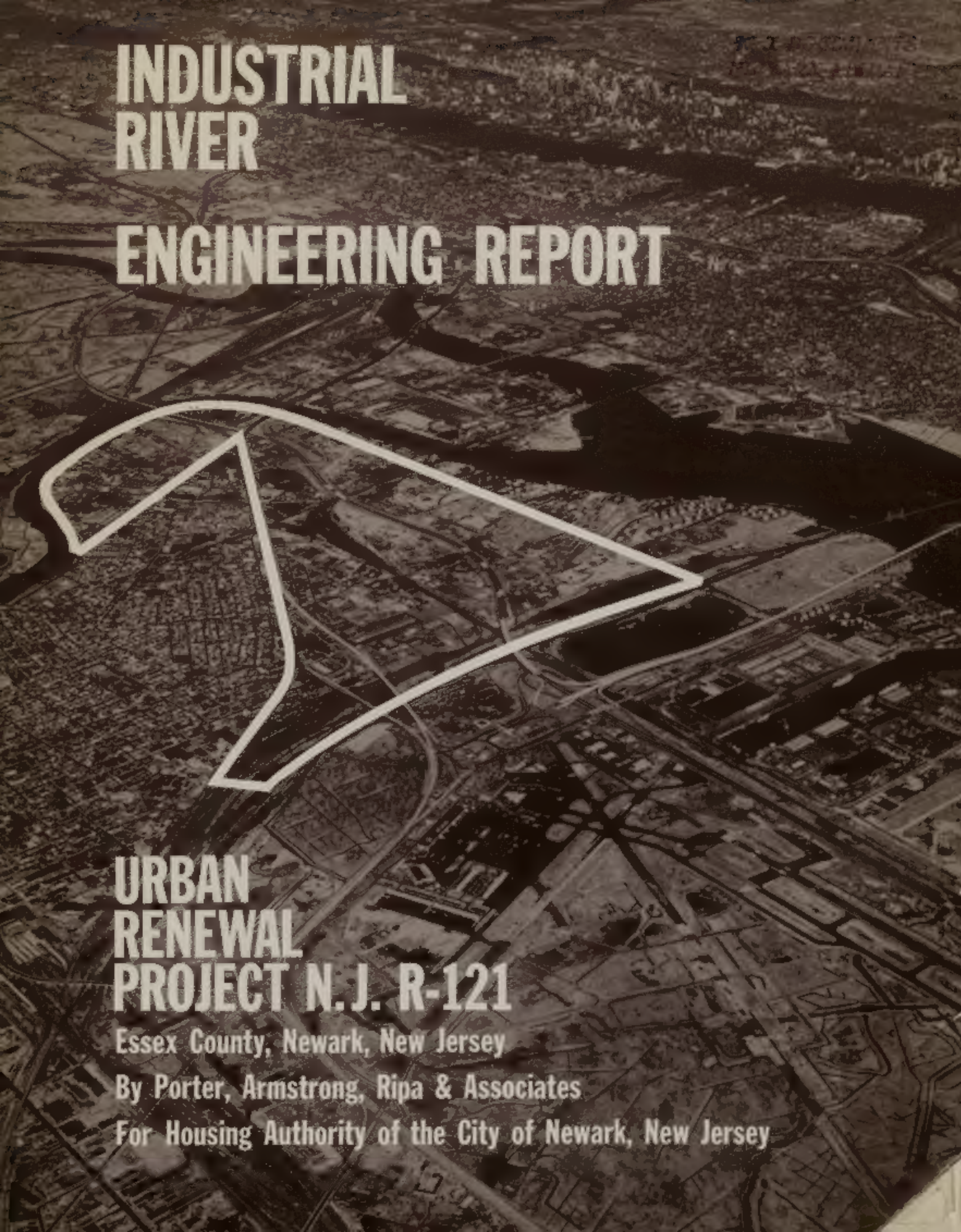

INDUSTRIAL RIVER

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For Housing Authority of the City of Newark, New Jersey

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LEONARD C. URQUHART
1945-1960

October 27, 1965

Housing Authority of the City of Newark,
57 Sussex Avenue
Newark, New Jersey 07103

Gentlemen:

We are pleased to present our Engineering Report on the "Industrial River" Urban Renewal Project. The report covers our initial studies on project improvements, including subsoil and foundation conditions relative to the project, and the comprehensive utilization of the area it comprises.

The report has been prepared in accordance with the requirements of our conference with you on January 15, 1964.

The problems of achieving satisfactory foundation conditions, including costs and scheduling, were investigated and solutions were developed under the various alternative technical and administrative procedures.

Existing utility, storm drain and transportation systems were assessed and those improvements necessary to permit the realization of the goals and objectives of the renewal effort were determined. Preliminary designs and layouts of the various improvements were carried to a point at which feasibility could be established, costs estimated, and scheduling problems clarified.

We are enthusiastic about the opportunities this project can provide for the growth and betterment of the Newark area. We believe the methods outlined will convert a generally blighted, discouraging area into an industrial complex that will be a credit to the City, both economically and esthetically.

The cooperation of your office and the various personnel of the Authority, as well as that of the other public and private organizations which have been associated with our work, is sincerely and gratefully appreciated. We are most pleased to have had this opportunity to be of service to you.

Sincerely,
Porter, Armstrong, Ripa & Associates

O. J. Porter

Ellis L. Armstrong

INDUSTRIAL RIVER URBAN RENEWAL PROJECT ENGINEERING REPORT

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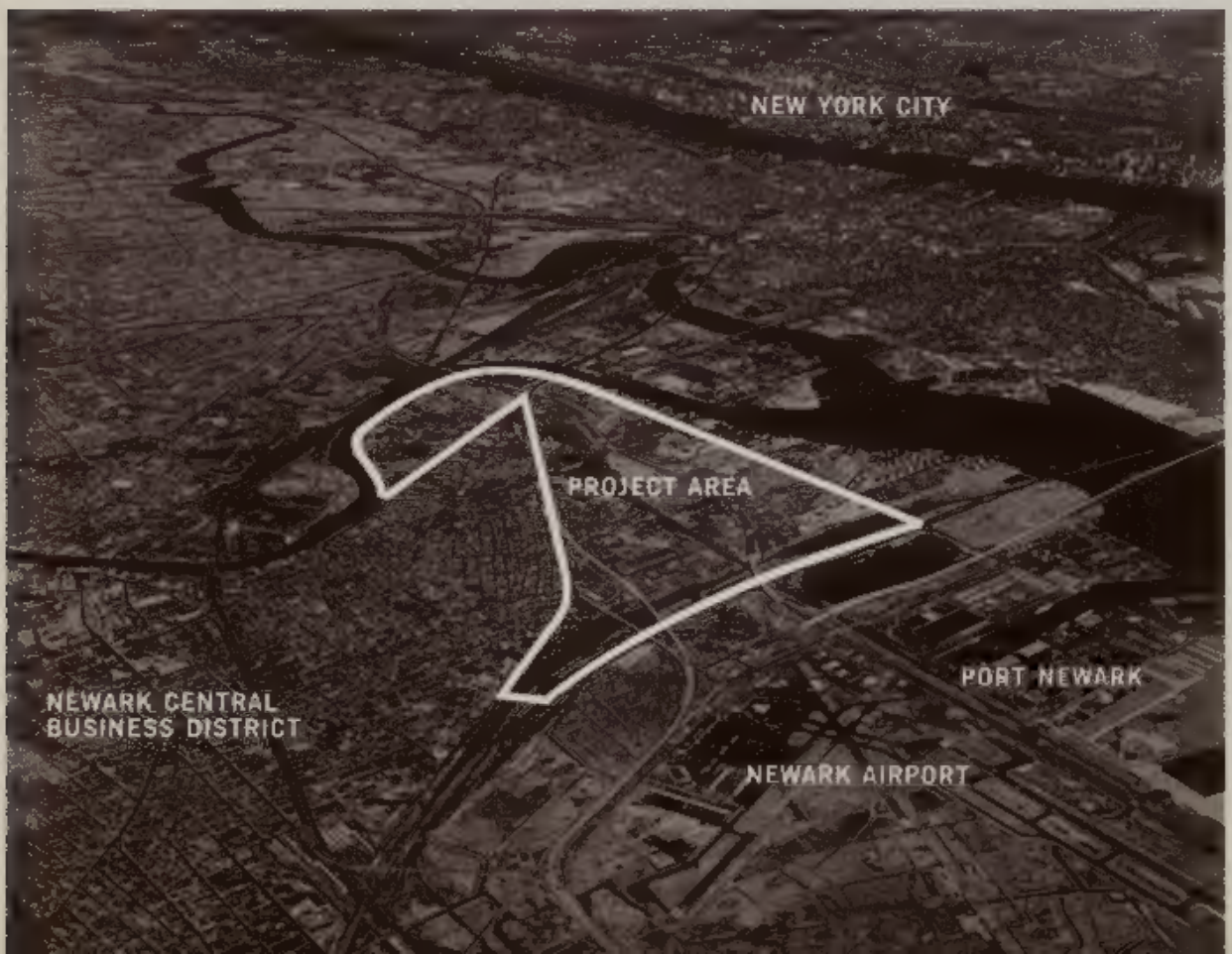


ILLUSTRATION No. 1
Aerial View of Project Area.

INTRODUCTION

THE MEADOWS

More planning, plotting, sketching and dreaming have been applied to the New Jersey Meadowlands than to perhaps any other similar real estate tract in the country. Yet the lack of any substantial development is proof that some of the basic ingredients of the real estate development process, whether political, economic, or technical in nature, were and still are missing. And so the history of the Meadowlands of northern New Jersey has been one of apathy, frustration, and failure.

Called by Fortune Magazine[1] " . . . the most valuable piece of undeveloped real estate in the world", the Meadowlands consist of about 30,000 acres of salt-marsh swamp, cattails, and dumps magnificently located in the core area of the greatest concentration of urban land in the world. It is in the center of the New York-New Jersey Metropolitan Region of over 17 million people; thus both skilled and unskilled labor is available in abundance. It is in the middle of the world's richest, most active market area, served by a vast land, sea, and air transportation network, traversing or terminating in the meadows.

The Meadowlands are the product of river erosion and deposition, and repeated inundation by the tides. The layer by layer deposition and constant saturation of the organic and inorganic sediment have produced a heavy mud of varying thickness and depth. These marshy conditions have restricted proper utilization because of high construction costs and uncertainties involved in providing satisfactory roads, streets, parking areas; properly supporting water and sewer lines; and supporting structures on pile foundations.

The Meadows have proved useful. In early Colonial times, they grew stands of white cedar which were used for road planking, ship building, home construction, and in many other profitable ways. Brick clay was mined until the turn of the century. Salt hay for packing purposes was grown until the 1920's.

Eventually tidal waters invaded the land as it slowly and progressively sank below sea level. Today, the Meadows stand largely unproductive and undeveloped, except for major transportation arteries and piecemeal uses along them. There are certain other uses which for technical reasons will pay the high cost of proper foundations for the sake of locational advantage, such as power plants. There are also some uses which actually constitute a step backwards, such as refuse dumps, slaughterhouses, and junkyards.

Barring some unforseen and unlikely large and sustained government investment in park land or other similar community facility, the area, or any sizeable part of it, will not be adequately developed until there is assurance that such development can be achieved on an economically sound basis. The private investor must be convinced of a financially sound, practical plan, and the various entities of government want good tax return and employment opportunities.

These are the two major forces which will eventually cause the development and rehabilitation of the entire Meadowlands: (1) the growing demand for industrial land, with the supply running out; and (2) the serious and rapidly rising demand within the surrounding urban areas for new employment opportunities for all types of labor. These persistent forces have already caused action on the fringe areas and isolated parts of the meadows, especially where foundation problems are found to be less troublesome. Such is the case with the Industrial River Urban Renewal Project.

THE PROJECT

The Industrial River Urban Renewal Project involves the development, renewal, and rehabilitation of approximately 1700 acres of land on the eastern edge of the City of Newark. The project is under the direction and control of the Housing Authority which is the Redevelopment Agency for the City of Newark; and it is federally sponsored by the Urban Renewal Administration of the Housing and Home Finance Agency under the Housing and Urban Development Act of 1965 (Housing Act of 1949, as Amended). The Passaic River bounds the area on the north; Doremus Avenue on the east; the Pennsylvania Railroad line, Pulaski Skyway and Raymond Boulevard on the west; and the Pennsylvania and Lehigh Valley Railroad yards and tracks on the south. Drawing No. 1 is a map and Illustration No. 1 is an aerial photograph showing the project area.

The project is considered to be prime industrial land because of its central location in the metropolitan area; the large labor market – professional, skilled and unskilled – that it can freely draw upon; its strategic location as a central assembly and distribution hub for the metropolitan market area and the

[1] Fortune, May 1963.

whole eastern seaboard; and the complete utility service and transportation facilities available.

It has not developed to even a fraction of its potential because of some reasons that are obvious, and others that are not so obvious. The obvious are the poor, uncertain, and misunderstood foundation conditions; very unsatisfactory road and utility conditions; ineffective drainage; the undesirable mixture, condition and type of existing uses; and probably most significant, the discouraging image of the entire area. The not so obvious are the odd shape and size of the existing lots, the cloud on the ownership caused by a riparian rights[2] question, and, probably more serious than it is usually considered, the psychological resistance to building in the Meadows.

GOALS OF THE PROJECT

The Urban Renewal Plan for the area has established the following stated objectives:

"(a) Clearance, redevelopment, rehabilitation and conservation actions in blighted areas, to establish an efficient, well organized complex of industrial and auxiliary service uses.

(b) A controlled development, rehabilitation and conservation of uses in the area; to achieve compatibility between both existing and new uses; to introduce design and aesthetic considerations; to achieve compatibility not only between specific uses, but also compatibility in the design of public facilities, landscaping, signs, and specific exterior elements.

(c) Improvements of appearance and structural condition of both new and rehabilitated structures; introduction of current design and engineering concepts; consideration of individual structures in terms of their relationship to their surroundings, as well as to the area as a whole.

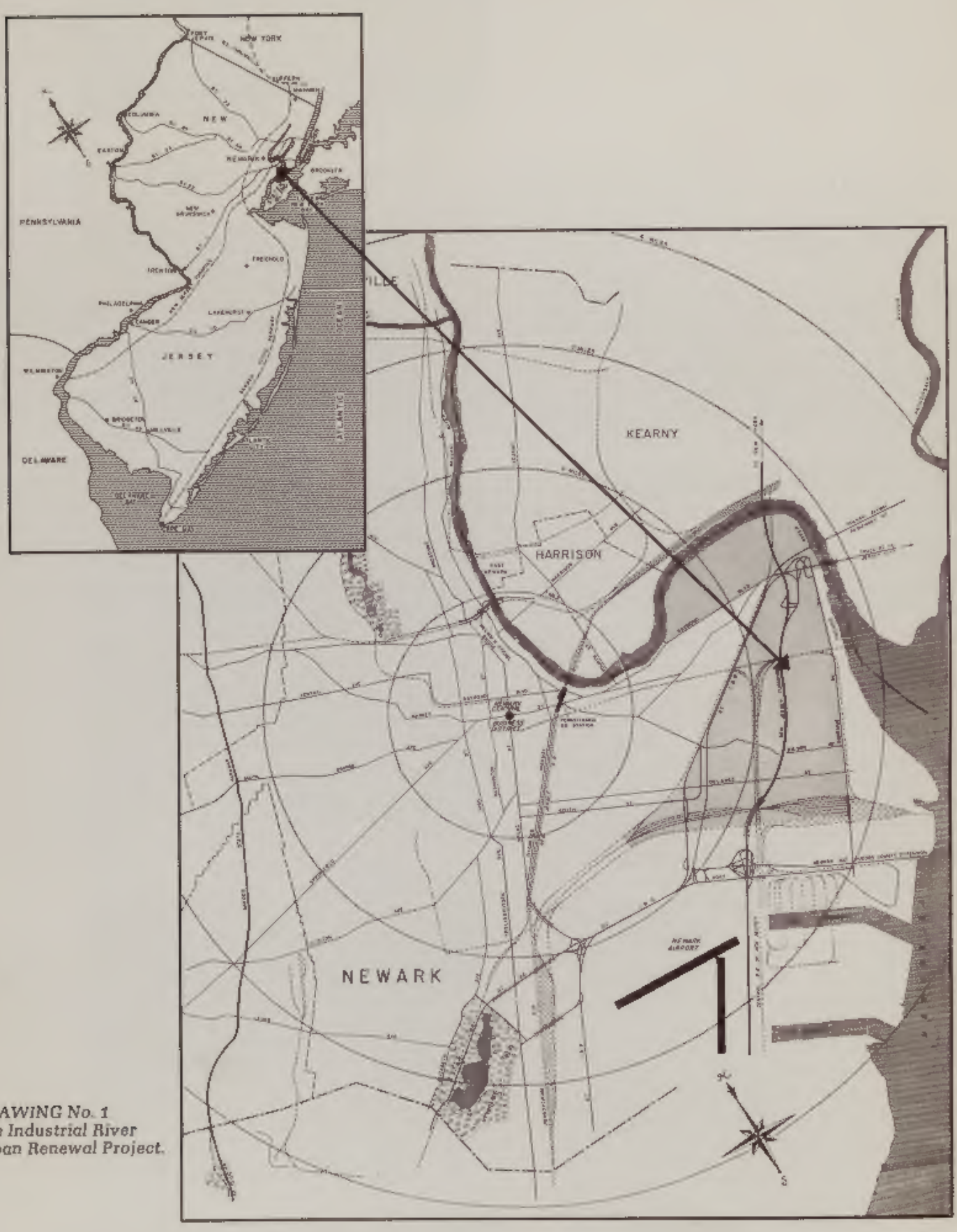
(d) Provision of a greatly improved traffic circulation system; to achieve an optimum utilization of land; to relieve traffic congestion; to improve the system of public transportation; and to increase off-street parking and loading facilities.

(e) Encouragement of greater private investment in the Project Area for the purpose of strengthening the municipal tax base and increasing the number of jobs."

As the major portion of the project area has been unused or misused for years, improvement can be made only with comprehensive, unified, and sustained effort. Piecemeal, sporadic, and incomplete attempts to solve the problems can accomplish very little except to perpetuate the present undesirable conditions with probable acceleration of the decline of the project and its surrounding area. The approach at this stage must be well planned, bold, and complete, util-

The "Meadowlands"

[2] This refers to the State's claim on the title of certain lands subject to inundation now and in the past. An excellent review of the problem is found in an article by Alfred A. Parro, Jr., Municipal Attorney, Borough of East Rutherford "Reclamation or Damnation — The New Jersey Meadowlands," *New Jersey Municipalities*, Vol. XLI, No. 8, November 1964.



DRAWING No. 1
The Industrial River
Urban Renewal Project.

Present uses of land in the project area will be upgraded

.zing the administrative tools provided by urban renewal, and the latest and best proven engineering te hniques to resolve the physical problems

To accomplish the goals the physical shortcomings must be corrected to as great a degree as is practicable. With present proven methods of stabilization the unstable foundation conditions can be economically corrected with a well plannned .arge-scale operation

Total clearance of the land is neither desirable nor justified. The action contemplated is that which is possible. with full consideration given to all the legal social political. and physical limitations present Plans for accomplishment are realistic without unnecessary compromise with existing shortcomings or indiscriminate destruction of the good with the bad

THE URBAN RENEWAL EFFORT

To accomplish the goals outlined above, the urban renewal effort will include the following

1 The elimination and prevention by restrictive ordinance of all obnoxious land uses

2. The accumulation of land into parcels large enough for significant industrial use

3 Enlarging the capacity and rebuilding and extending the water and sewer systems to give adequate service to all parcels.

4 Establishment of minimum elevations for the area and the construction of a storm drain system capable of providing effective drainage for the entire area

5 Extending, relocating. and rebuilding the street system to one capable of serving the industrial complex. This will include the widening and new construction of bridges and underpasses for both access and circulation

6 The presentation of grade. subgrade foundation and refuse conditions and costs of solution in a manner that will permit preliminary estimates of land preparation costs

The area has been declared blighted, and it is eligible for tax concessions under the State's Fox-Lance Law which provides added incentive for industrial construction and rehabilitation. In addition the Federal Area Redevelopment Administration has declared the City of Newark a ' Redevelopment Area" and the project area is therefore eligible for Federal assistance under the Area Redevelopment Act.

The riparian rights problem and its solution are currently under review and analysis by the State

SCOPE AND PURPOSE OF THE STUDY

This analysis and report are to satisfy the requirements for the Project Improvements Report of Part I of the Application for Loan and Grant (Code No R 224) of the Industrial River Urban Renewal Project N J R 121 The objectives of the study are as follows

1 Delineate and interpret subsoil conditions describe and explain pertinent methods of treatment, and establish preliminary cost data, and information that will permit the preparation of preliminary cost estimates of the development of any parcel under various alternatives

2 Delineate the modifications and extensions to the utility and road systems, set general design requirements, and establish priorities and distribution of costs.

3 Lay out the solution to flooding problems, establish minimum grade for improvements, lay out and set general design requirements, and establish priorities and distribution of costs for a storm drain system.

SUMMARY AND CONCLUSIONS

Foundation Problems: The foundation problems of the area include one that is man made and two of natural origin

The man-made problem is the four refuse disposal areas within the project. The solution is simple but acceptable only because no reasonable alternative exists It can be moved or covered Moving it is expensive and unless the amounts involved are comparatively small, economically prohibitive As a

is becoming progressively more difficult to find disposal areas for obnoxious or useless refuse. It will have to be spread thoroughly compacted, and covered with clean fill

The two problems created by nature are the low ground elevations permitting tidal flooding and making runoff drainage difficult, and the unstable foundation soils The former may be corrected by raising the ground elevations. Where the elevations cannot be raised because of existing construction or facilities which will not be redeveloped, pumping will be required to provide adequate drainage

The unstable soils will require stabilization by overloading, and use of sand drains where greater thicknesses exist; or they will require removal and replacement with compacted fil.

New drainage system required

Total preparation work for any particular parcel will vary according to local conditions and will range from simple grading and clearing to extensive refuse grade and stabilization problems. It is recommended that the Newark Redevelopment Agency prepare the land in large segments prior to disposition because this will result in greater control on standards, greater economy and in doing a complete job once and for all.

Piling will be required for rigid buildings with heavy loadings This is true at most development sites, and it is not a disadvantage peculiar to the Newark Meadows. Rock level is fairly deep in most of the project area and friction piling, which usually means treated timber or some form of concrete piling, is indicated unless extremely heavy loadings are contemplated

Based upon these preliminary studies, and with large enough areas developed at one time to provide economy in furnishing and handling fill materials as discussed on Page 14. it is estimated that the project land can be developed for use at an average cost of about 35¢ per square foot or approximately $15,000 per acre. and may reach as high as $30,000 per acre in the more adverse areas This cost includes bringing the land to grade, replacing or stabilizing the weak foundation soils, and spreading and compacting the refuse.

In general the technical problems can be solved with present day techniques of exploration testing, analysis. and proven methods of foundation stabilization. With proper procedures. satisfactory foundation conditions can be assured at costs well within reason, considering the great potential of the project area.

Site Improvements: Streets and utilities in the project area are generally in poor condition. The proposed site improvements include an extensive reconstruction of the existing street system, and extension of the system to service presently inaccessible areas, installation of a storm drain system, increasing the capacity of the water and sewer systems, and extending the systems to service the total area and adjustment of the power and gas distribution systems and telephone facilities to service the planned new development.

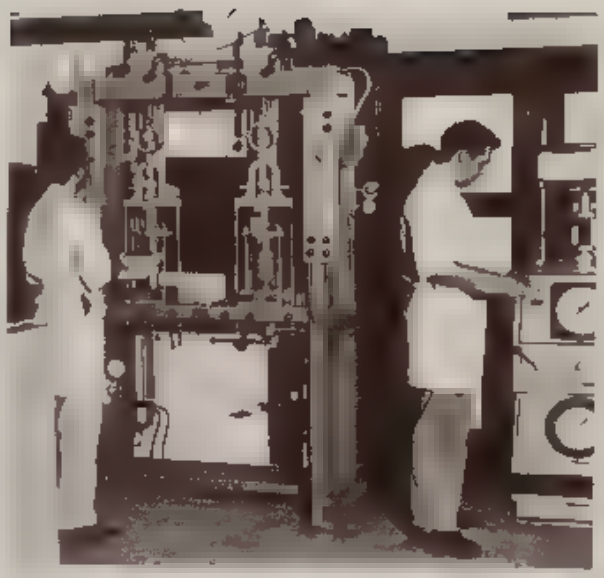
The total cost of the proposed site improvements is estimated at $14,500,000 By far the most expensive single improvement will be the correction of the totally inadequate street system. In but a few instances existing streets will serve their purpose under the Plan As a rule widening and/or resurfacing or total reconstruction of the street will be necessary New streets are planned to complete the circulation system and to supply access to all parts of the project The cost of improvements to the street system, including structures and traffic devices, will amount to almost one-half of the total cost of site improvements.

Except for some minor, rather incidental piping, there is a complete lack of any storm drain facilities in the project area An almost entirely new storm drain system will, therefore, have to be constructed. As proposed the system has been designed to handle the maximum probable runoff to be expected over a five year period, assuming the maximum rainfall over a 20-minute period

Improvements proposed for the water distribution system include increasing the capacity as needed and extending both the high and low pressure systems to service the total project area Improvements proposed for the sewer system also include some local increases in capacity and the necessary extensions

Prior to the adoption of the Urban Renewal Plan the plans for street, storm drains, water distribution and sanitary sewer improvements were submitted to the various municipal agencies for their concurrence and approval Plans were also submitted to the various private utility companies supplying the area Preliminary cost estimates of the changes and extensions made necessary in their systems by the Urban Renewal Plan were requested and received

Total cost estimates of all site improvements and detailed breakdown of the street, storm drain water and sewer system improvement costs are found on Drawing No. 9J of the pocket appendix



Triaxial Shear Testing of Meadowlands Soils

SUBSOILS AND FOUNDATIONS

The following section presents data concerning the physical condition of the land the steps that need to be taken to prepare the land for use, and the costs and other implications of the recommended process

EXISTING CONDITIONS

Soils and Foundation Conditions: The area is generally covered with a surface layer of miscellaneous fill of varying thicknesses This is a catchall designation for just about anything that can be carried into the area and dumped, from unclassified refuse to prime fill Generally, it has been dumped there to get rid of it, along with the hope in some areas that some stabilization of the marshlands would result Of particular concern are those areas that have been used as dumping grounds for unclassified refuse because of the implications on construction and general re use of the land

A layer of varying thickness of what can be called the "compressible" exists over a large part of the project area immediately beneath the surface layer of the miscellaneous fill It is a layer of organic silts and or peat ranging from 5 feet to 20 feet or more in thickness in some parts of the area For the most part it is between 5 and 15 feet thick with the top surface generally at about sea level

Between the "compressible ' and bedrock is a layer generally 30 to 60 feet in thickness of sand and or silt with some clay These strata have fair supporting values

Bedrock consisting of Brunswick shale formation slopes down toward the river and reaches depths of 90 feet below sea level In the area of the intersection of Wilson Avenue and the New Jersey Turnpike there is a table of the bedrock which rises to an elevation of minus 20 feet or about 30 feet below the ground surface

Specific subsoil investigation will be needed of course, to clarify local conditions prior to firm decision on specific foundations Complete delineation of the conditions will be needed for specific construction design calculations, however the information presented in this report will permit reliable preliminary studies to be made

The following drawings, which are included in the pocket appendix, illustrate various data and information concerning the subsoil and foundation conditions in the project area

Drawing No. 9A, Soil Explorations: This drawing shows all of the boring holes made in the project area including those made specifically for this study as well as those which have been made during the last 20 years or more by various agencies. Part of the latter borings were made by the Consultant under previous assignments, and the remainder are from the Consultant's Meadowlands files which have been built up during the past 20 years

Generalized descriptions of the logs of each of these holes are included in the tabulation on the drawings Detailed logs of the borings taken specifically for this study are available in a separate report appendix Illustration No. 2 is a selected log on one of the holes near the center of the project

Pressure-Void Ratio Curves for representative samples of meadowmat and organic silt are shown on Illustration Nos 3 and 4. Such curves for a more stable material, brown clayey silt, are shown on Illustration No. 5. The curves generally indicate that the compressible materials may be expected to consolidate about 10^{0} s under a 1000 pounds per square foot load Where the thickness of compressible is about 20 feet the anticipated settlement would be about 2 feet. In some areas, where the meadowmat contains a higher percentage of peat the settlement could be 4 feet or more With the use of sand-drains the time required for this consolidation would be from 10 to 14 months.

Drawing No. 9B – Thickness and Depth of Compressible Material This drawing shows the approximate thickness throughout the project area of the compressible material, which consists of the organic silts and peat or 'Meadowlands Muck' The extent of the various thicknesses are shown by the contours Also shown are the contours of the bottom of the compressible material and of the existing ground surface

Drawing No. 9C Depth of Rock and Refuse Area: This drawing shows the elevation of the top of bedrock, the ground surface contours, and the thickness location, and extent of the refuse areas Note the high point in the bedrock near the intersection of Wilson Avenue and the New Jersey Turnpike In this area, bedrock is only 30 feet below the surface

Drawing No 9D Cross Sections This drawing presents selected cross-sections of the subsurface conditions in various areas of the project. The section locations are shown on Drawings 9B and 9C The relative thickness of the "Meadowlands Muck' is clearly illustrated.

ANALYSES OF FOUNDATION PROBLEMS

Preparation of the project land for use will include achieving a minimum grade above the tide levels, solving the refuse dump problems, and stabilization or replacement of the compressible material. The following paragraphs discuss these problems and recommended solutions.

Grade of the Project Area Surface: The maximum high tide in the area, as reported by the U S Corps of Engineers is 8.4 feet above Mean Sea Level, as defined by the 1927 Datum of 0.00 elevation at Sandy Hook All the project area contours and elevations, as shown on the drawings are based on this datum

Tides in excess of 6 feet can be expected about 5 times a year Mean high water is 2.8 feet and the daily fluctuation is about 5 feet

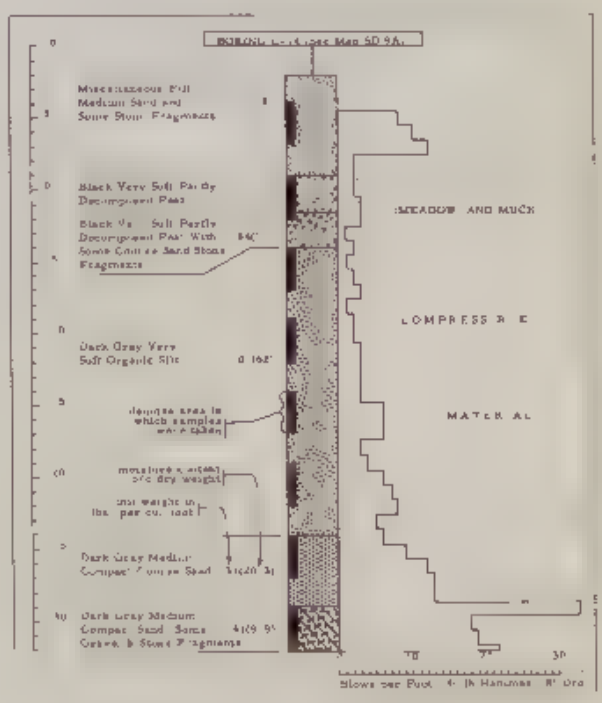


ILLUSTRATION No. 2 Selected Boring Log.

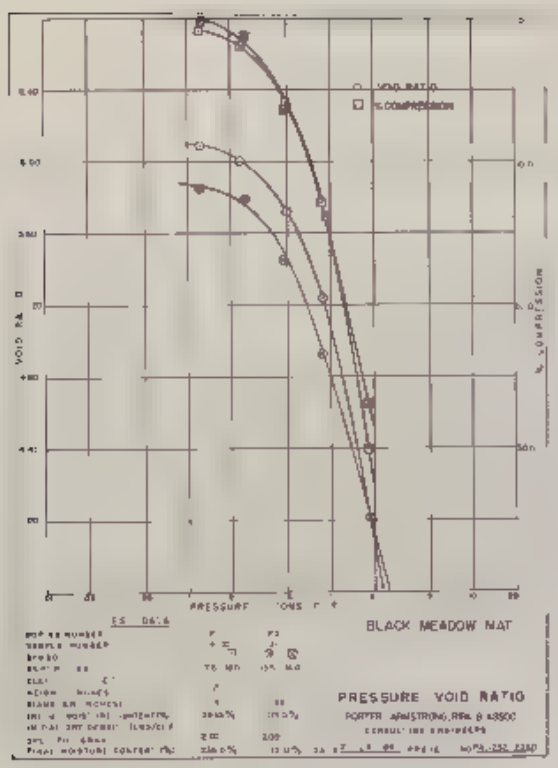


ILLUSTRATION No 3

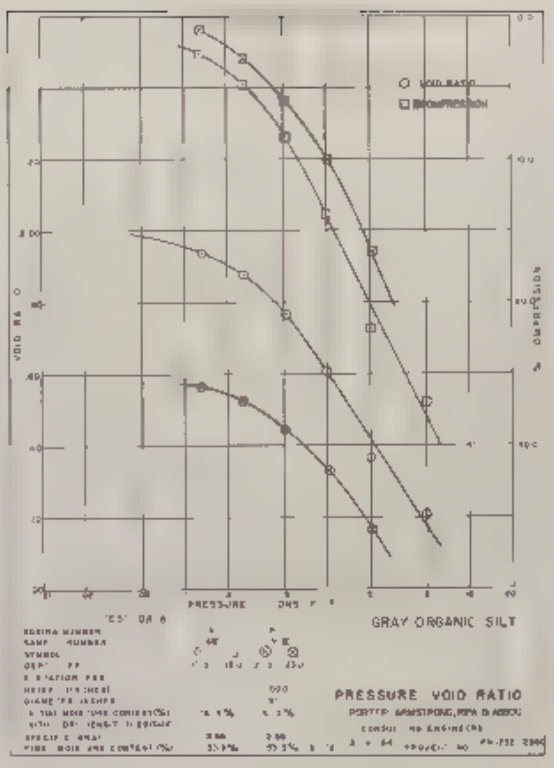


ILLUSTRATION No 4

The storm drain system proposed for the area is shown on Drawing No. 9G and is designed to handle the maximum probable runoff from a built up area to be expected over a five-year period, assuming the maximum rainfall over a 20-minute period.

The development of the flow characteristics of the proposed system was based upon the above rainfall criteria, consideration of the grade of intake and outfall, general design and cost factors of the system and the need to provide against flooding from high tides. The Urban Renewal Plan states

"In order to achieve a satisfactory and efficient system of storm water drainage in the Project Area, certain basic minimum elevations will have to be attained by new users of project land. Similarly certain basic minimum elevations will have to be observed by existing to remain users. As an alternative to establishing minimum elevations in either of these two cases, installation of pumping facilities to efficiently drain the land in question will become mandatory. Such minimum elevations will be established with relation to engineering drainage considerations which may differ from place to place in the Project Area. Therefore, the question of proper flood plane elevation will be examined by the Review Board and minimum grades for all improvements on the land will be set at the time of, or prior to, the submission of preliminary plans by every developer."

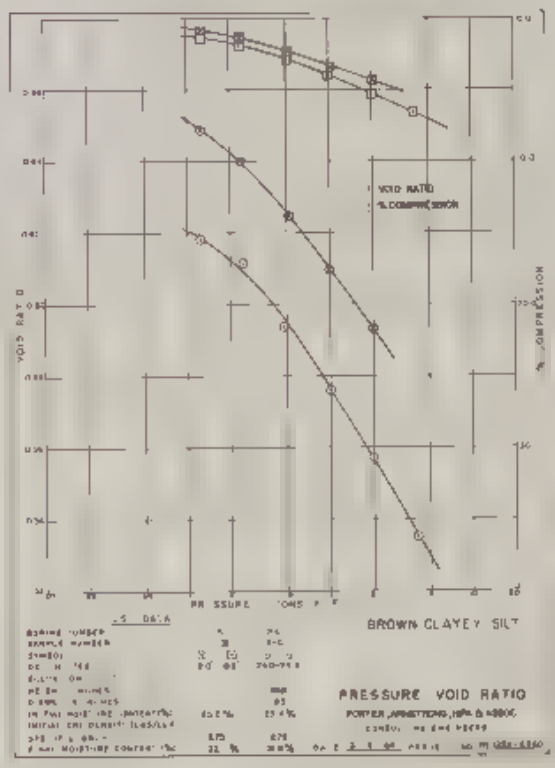


ILLUSTRATION No. 5

At present part of area is flooded with every storm

The 8.4 foot contour or maximum high tide level in the area, is shown on Drawing No. 9B. Flooding in the area, however, is caused primarily by the inability of the existing drainage system to drain storm runoff.

The Refuse Dump Problem: There are four refuse dump areas in the project, as illustrated on Drawing No. 9C. Two of these are of major importance because of their size and the height to which the refuse has been piled. For the most part these dumps contain obnoxious and unclassified refuse. The largest is a tract of approximately 85 acres between Avenue P and Doremus Avenue directly north of Wilson Avenue. It is no longer active as a dumping area. The second area of major importance is a 23-acre tract in the area bounded by the Lehigh Valley Railroad on the south, Delancy Street on the north, the New Jersey Turnpike on the west, and Doremus Avenue on the east. This area also is no longer active.

Of the two remaining areas, one is a comparatively small tract of less obnoxious waste of about 15 acres. Is is located between the New Jersey Turnpike and the New Jersey Central Railroad Yards about halfway between the New York Branch Central Railroad and Wilson Avenue. This refuse is primarily waste from a commercial incinerator at that location.

The remaining refuse disposal area is a 23-acre tract west of the New Jersey Turnpike in the vicinity of Delancy Street. It has been inactive for several years.

The treatment of the refuse problem is at best a compromise. The preferred treatment would be to remove it from the area but, except for incidental minor deposits and for specific limited special purposes, this would be economically unfeasible. So the only practicable solution to the refuse problem is to spread it, compact it as much as possible with a heavy roller, and cover it with good fill material. A cover of two feet is considered the practial minimum.

For specific development in the refuse areas, careful and thorough investigation of the refuse material in the particular area is advisable to determine extent of future problems. For example, if a likelihood of gases being generated from refuse decomposition exists, provisions can be made at the time of construction to take care of this problem. Also, the continuing supporting values will have to be carefully evaluated in the design of structure foundations.

The Compressible Material Problem: The concern over the "Meadowland Muck" has been a major deterrent to development, and rightly so. The problem can prove costly to any construction if it is ignored or not adequately resolved. Continued expensive reconstruction of pavements and other public utilities, the repair of collapsed flooring due to unanticipated settlement, the continual sinking away of roadway slabs adjacent to truck loading docks are examples of the many problems arising from attempts to solve the Meadowland construction with the inexperienced hand.

Proper treatment of the foundation in the past has not been economically feasible for most development. Also, the methods that would insure results were not established. Today both of these objections can be overcome with proper techniques. Methods to provide completely satisfactory foundations for developments have been well established, as evidenced by the sucessful stabilization of the foundation of the New Jersey Turnpike through the area, and the highly successful operations in the Newark and Elizabeth Port areas. Treatment of areas large enough to provide economies in furnishing and handling fill materials, as will be discussed later, can produce results well within the economical limitations.

There are two basic methods of achieving acceptable foundation conditions for construction on compressible material. This includes stabilization of the compressible material and its replacement with compacted fill.

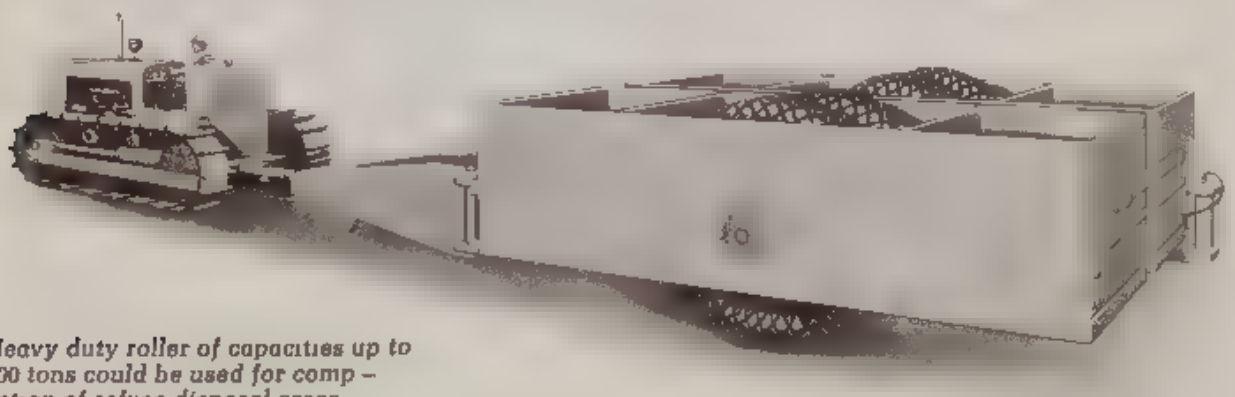
Refuse Dumps – *Land Use that is a Step Backwards.*

Stabilization of the Compressible Materials A number of methods have been used to strengthen unstable foundation soils The injection of various chemicals or cements into the soil in specialized situations has produced some degree of success However the project area soils are not conducive to this type of treatment as they are generally much too impervious for such injections to be effective

Consolidation of the soils has been accomplished by overloading the surface with earth embankment material with a weight greater than the final structure load, and leaving it in place until the excess water is "squeezed" out and most of the consolidation or settlement has taken place This works satisfactorily for lesser depths of compressible material less than ten feet in thickness – and for some materials that contain sand layers that will provide drainage. For greater thickness, this method requires many years to reach satisfactory results.

The consolidation from overloading is speeded up by providing vertical sand drains, closely spaced This allows the water to escape and the load to be carried by the soil grain structure which develops greater load carrying contact as the reduction of voids between the grains progresses

Water has also been removed by an electro-osmotic process which is based on the principal that a direct current will induce a flow of the water in certain types of soils from a positive to a negative pole At the negative pole, which can be steel sheet piling, rods old rails or some similar installation the water is



Heavy duty roller of capacities up to 200 tons could be used for compaction of refuse disposal areas.

collected and removed However, this is considered practical only under special conditions and is limited in extent

For the project area, where the compressible material is over ten feet in thickness, overloading in combination with vertical sand drains is the most practical and economical method of consolidating the foundation satisfactorily Generally the procedure would be first to place 24 to 36 inches of sand over the area for the surface drain. Then the sand drains would be installed in a regular pattern with center to center spacing depending upon the time required for the finished facility The method of installing sand drains is shown on Illustration No 6

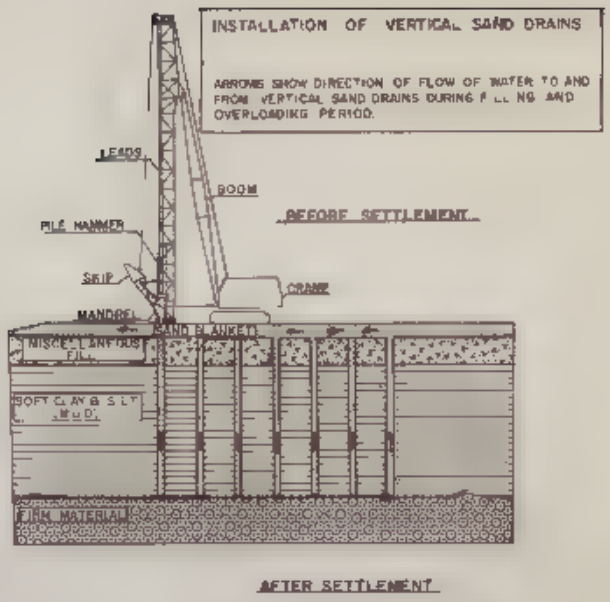
The overload is then placed under a controlled rate, depending upon the thickness and characteristics of the compressible material in the area. This material has low resistance to lateral flow, and if the loading is concentrated and placed at a high rate the 'muck' merely flows laterally in a mud wave and the fill settles into the void.

In the project area, a 10-foot overload above final grade elevation of +10.0 will generally produce satisfactory consolidation within about a year's time The consolidation can be speeded up with a heavier overload and closer spacing of the drains, however, a period of about nine months should be considered a minimum

The rate of settlement, as one would expect decreases considerably as stabilization proceeds and eventually a rate and residual of settlement is reached that can be tolerated by the intended construction. At this point the overload is removed and the construction of the improvement proceeds Generally, in the project area, no appreciable rebound will occur when the overload is removed.

For the areas of less than about 10 feet of compressible material, consolidation can be effectively obtained without the vertical sand drain installations. Some additional time may be required, depending again upon thickness and location, and the amount of overload can be varied.

Excavation of Compressible Material and Refill with Compacted Embankment An alternative method of coping with unstable foundation soils is to excavate the unstable material and replace it with compacted fill In the project area this would be an expensive alternative, as the top of the compressible material



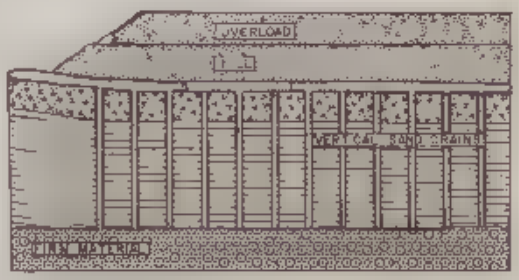
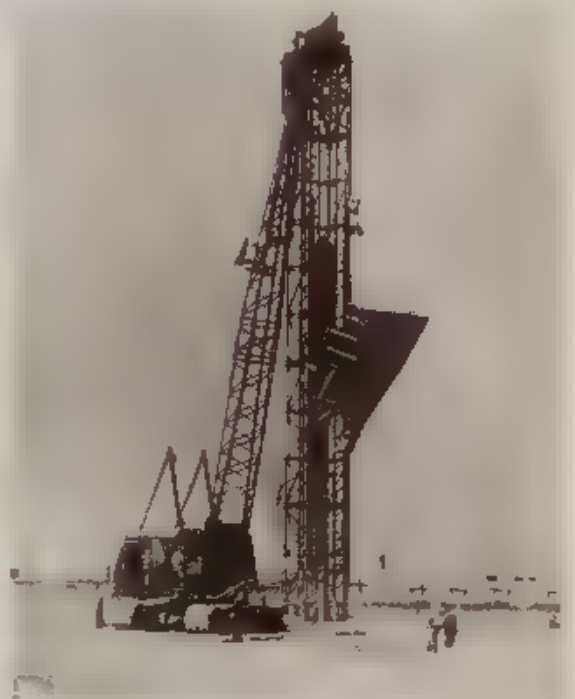


ILLUSTRATION No. 6 Overload – Vertical Sand Drain Method of Stabilization of the Project Area.



Vertical Sand Drains being installed The sand is dumped from the skip into the steel mandril as it is being driven.

is generally at about sea level while the present ground surface is at about elevation 8 or higher This would require removal of about 50 cubic yards of disposable material per 100 square feet of parcel area. where the compressible material is five feet thick. and replacing it with a like amount of compacted fill The disposition of muck material would likely be as expensive as the procurement of fill

In the project area this method of handling would be reasonable only in selected areas where time or load considerations outweigh the economics of overloading and sand drain methods. The method used in all instances will depend upon the specifics of the particular development problem in the particular area of the project

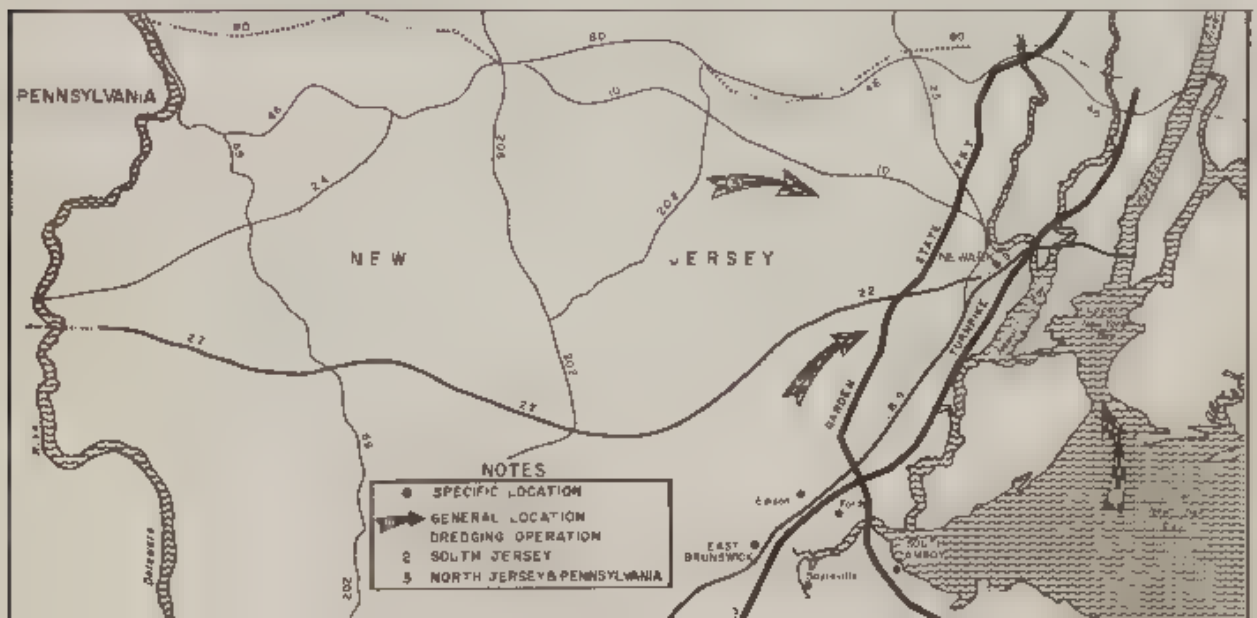
Land Preparation Costs Drawing No 9E shows the preliminary estimated land preparation costs over the project area These costs include spreading and compacting the refuse materials, and providing a minimum of 2 foot cover as required Also included is the cost of the stabilization of the compressible material, utilizing the overload method as above described with vertical sand drains where the compressible material is ten feet or greater in thickness These costs also include raising the grade to a minimum elevation of +10.0.

These costs are based upon an estimated unit price of $1 50 per cubic yard for sand fill and $1.00 per linear foot of vertical sand drains. These or even lower costs. can be obtained if a large enough area is treated to warrant large production hydraulic-handling equipment, utilizing sand barges or hopper dredges

For small area piecemeal development the land development costs will be much greater depending upon cost of available sand and embankment materials One source that has been considered at various times, and which may prove economical if low railroad freight rates can be developed, is the 'red dog' (carbonized slate) material from the coal dump fire areas near Woodbury, Pennsylvania Individual developers may be able to make special arrangements that will provide special prices, however, it is expected the small scale development will result in costs two or three times higher than indicated on Drawing No 9E.

Methods and Procedures There are two administrative procedures open to the Newark Redevelopment Agency to implement the plan and encourage the development of the project land. The first would be for the Agency to prepare the land for development prior to disposition The other procedure would be to sell the land "as is" and require the developers to fill the areas to grade and to prepare the foundation for their own purposes.

It is likely that both procedures will be used in acomplishing the project Some of the project areas are already under agreement with developers for purchase in their present states It is probable that some of the area will not be saleable unless the foundation conditions are corrected for the particular tract, and for the surrounding area to assure high-class development These preparations and assurances will make it more competitive in the market and will attract the most desirable developments from the standpoint of the project objectives.



DRAWING No. 2 General Sources of Fill Material

Sand fill being unloaded from barges by hydraulic method and pumped to site

There are several advantages to the Newark Redevelopment Agency preparing the land upon acquisition. They are as follows:

1. As discussed above, there is considerable economic advantage in preparing large tracts of the area at one time.

2. Development by the Agency would assure full compliance with the standards necessary to resolve the foundation treatment problem for the entire area, and would assure against "spotty" and incomplete treatment.

3. Much of the land acquired will probably not sell immediately. It should not be allowed to cast a shadow of blight and uncertainty on adjacent areas and on the entire project.

4. Individual developers would be inclined to stabilize only to suit individual specific needs and to meet the minimum standards of the Urban Renewal Plan. Thus, part of the tract may remain substandard.

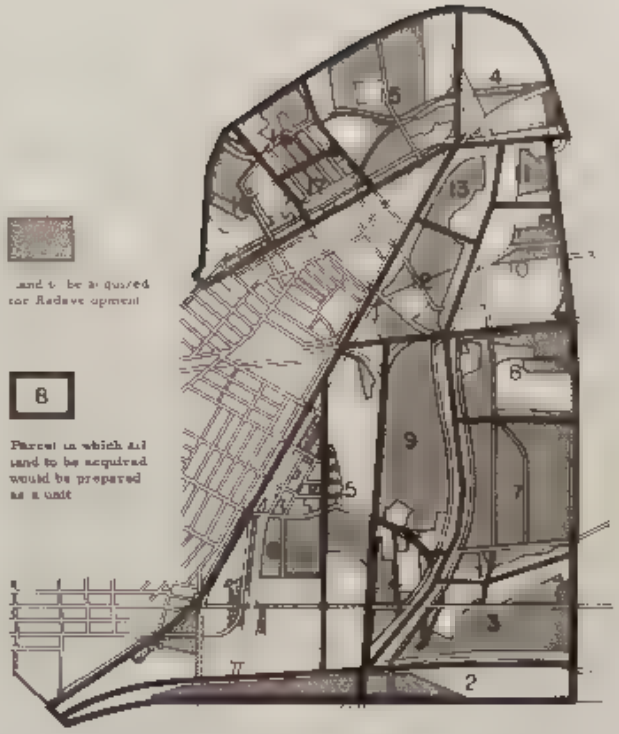
Since it is obvious that some parcels will be improved by private interests prior to the execution of the Urban Renewal Program, it is recommended that a minimum requirement be imposed that all parking areas, drives, approaches, storage areas, and all land within 50 feet of any major structure be stabilized, or compressible material be replaced with compacted fill.

The portion of the project area that will be stabilized by the Agency is uncertain at this time. However, to illustrate the most economical procedure of development, disposal parcels which involved significant preparation costs were divided into 18 preparation parcels. The division was made in accordance with the location of the most desirable points of intake for a hydraulic fill operation, priority of development for individual parcels, and the schedule, methods, and quantity of fill movement as the project progresses.

Table No. 1 shows the approximate fill and overload requirements for each section. See map of Drawing No. 3. Table No. 2 illustrates the intake into the project area, the flow, and the disposal of the fill and overload materials that could be accomplished with all stabilization and filling done by the Newark Redevelopment Agency.

PARCEL NUMBER	Estimated Acreage requiring significant preparation work	FILL NEEDED				
		Bring to minimum grade or cover garbage 1000 s of cu yds	Sand Drains 1 000 s of sq feet	1 000 s of cu yds	Total Fill to grade plus sand drains 1000's of cu yds	Overload 1000 s of cu yds height of overload at 0 feet
1	25	69			69	403
2	43	35	"		35	210
3	42	169			169	840
4	16	52			52	258
5	16	115	----		115	258
6	19	38			38	307
7	97	310	436	28	338	1 565
8	33	127	287	19	146	532
9	96	290			290	1 550
10	12	34	157	10	44	193
11	10	38	152	10	48	181
12	32	0	---			516
13	17	68	222	14	82	274
14	10	33	118	8	41	161
15	58	368	300	20	388	935
16	24	96	209	14	110	387
17	14	14			14	193
18	23	18			18	374
Total	565	1,874	1,881	123	1 997	

TABLE No 1 Quantities required for complete land preparation.



DRAWING No. 3 Parcels for Land Preparation

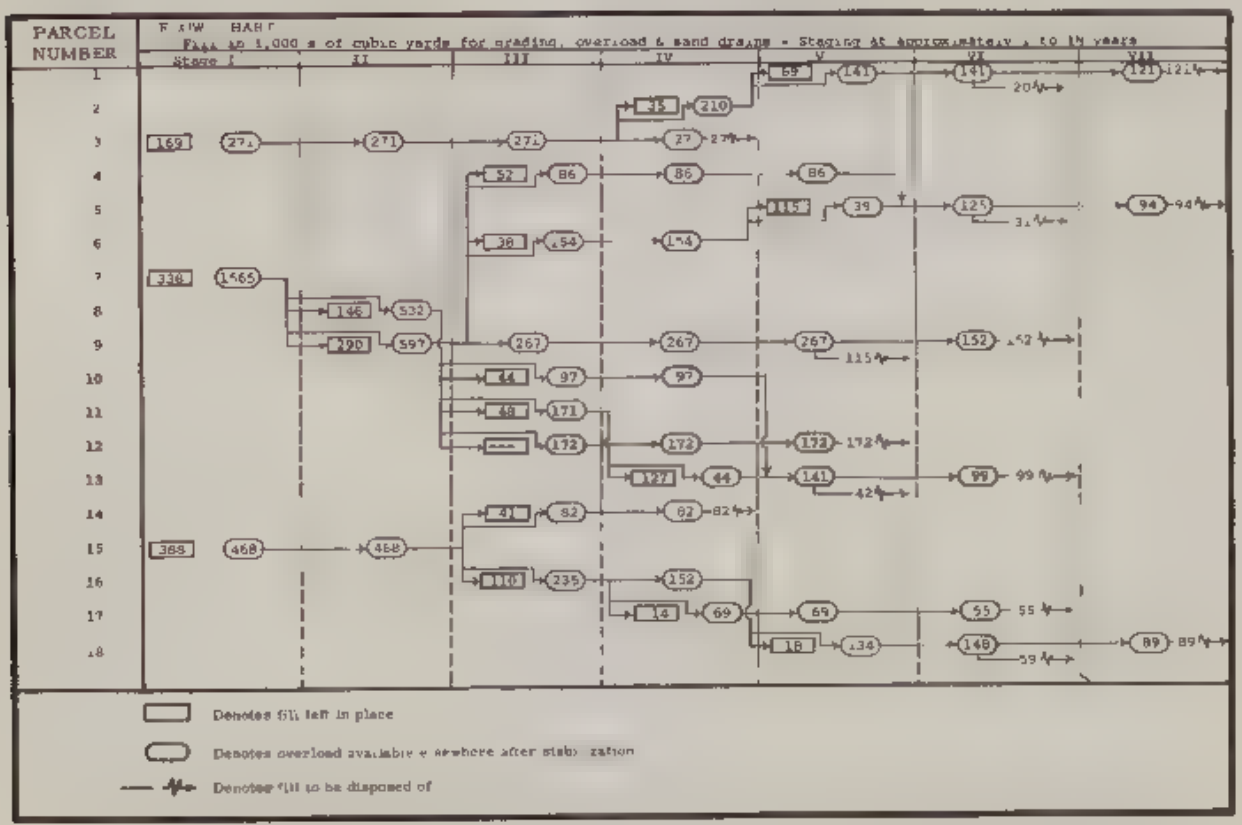
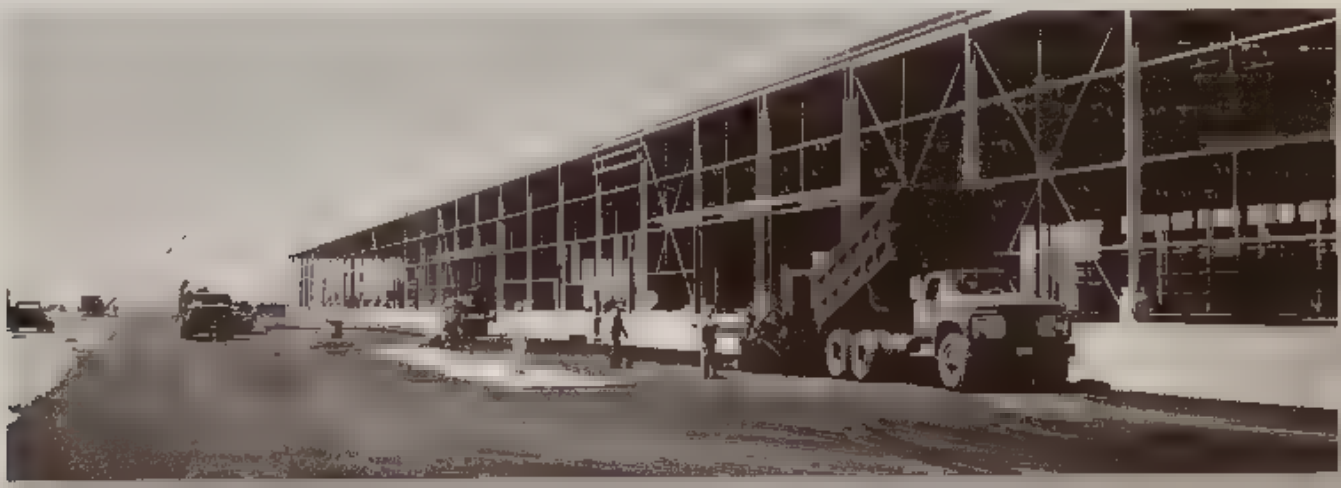


TABLE No. 2 Fill procurement, flow and disposal complete land preparation of entire project in one continuing operation

Piling for Foundation Support The areas stabilized by overloading and vertical sand drains can be expected to support loads of 500 to 600 pounds per square foot. Higher loads of say 1000 pounds per square foot could be provided by using 15 feet of overload. With the compressible material removed and replaced with compacted fill loads of 1800 to 3000 pounds per square foot can be reasonably supported. Where development requirements dictate greater loads, piling will be required.

Generally, friction piles of treated timber or cast in place concrete appear to be most economical for the project area. The in place costs of the treated timber piling will be about $3.00 per lineal foot, and the cast in place concrete will be about $4.50 per lineal foot. To develop supporting values the piling will need to penetrate 25 to 40 feet into the strata beneath the compressible material or overburden, or to bedrock. Drawings 9B and 9D present data from which the range of pile lengths over the project area can be determined.

Industrial Construction — an Appropriate Use of Newark's "Meadows"



Overload in Place

PROJECT IMPROVEMENTS

The proposed project improvements and extensions include street, storm drain, sanitary sewer, and water distribution facilities. Power, gas, and telephone services will be improved and extended by th utility companies on an 'as needed' basis in full cooperation with the Newark Redevelopment Agency program for the project. There is assurance that these utilities will be available where and when they are needed and in satisfactory quantity

Street Improvements: Improvement of the street system will be the most expensive single construction item in the project plan. The system never was adequate to meet the needs of even the area's substandard land use as it developed. Although there is evidence in the layout of some attempts to extend the system in an orderly fashion, the overall picture today is totally unsatisfactory

The streets and their related facilities are in poor physical condition and suffer from lack of adequate maintenance they are inefficiently laid out, leave many large tracts of land inaccessible, and were not designed to accommodate the type and amount of traffic using it today

The basic layout of the system can be accepted to some extent. The physical condition basic design, and lack of needed streets can be corrected, and the plan provides for these shortcomings

A stated objective of the Urban Renewal Plan is

> ' Provision of a greatly improved traffic circulation system to achieve an optimum utilization of land, to relieve traffic congestion, to improve the system of public transportation, and to increase off-street parking and loading facilities "

To achieve this objective will require extensive rebuilding, resurfacing, widening and new construction of streets and related facilities. Consolidation of the underlying compressible materials will be accomplished as needed. Drawing No 9F, Street Improvements, shows the scope, character and general design of these improvements and extensions

Following are the descriptions of the various improvements proposed

Road A This proposed road extends along the west side of the New Jersey Turnpike from Delancy Street to the New York Branch of the Central Railroad, and is needed to provide access to this largely landlocked area. The proposed right of way width is 60 feet with a proposed pavement width of 44 feet

Amsterdam Street This street extends from Niagara Street to Wilson Avenue and will be widened by 8 feet. The existing pavement is 36 feet with a right-of-way of 60 feet. The proposed improvement would be a 44 foot pavement on a 60 foot right of way A complete new surface is proposed

Road B This proposed road extends from the north end of proposed Road A under the New Jersey Turnpike then along the east side of the Turnpike south to Delancy Street It is planned for a 44-foot pavement on a 60-foot right-of-way

Road C This proposed road extends from Delancy Street along the east side of the New Jersey Turnpike under the Lehigh Valley Railroad, and then along the New York Bay Railroad The proposed right-of-way width is 60 feet, with a pavement width of 44 feet A structure will be required under the Lehigh Valley Railroad and another structure over the Elizabeth Branch of the Central Railroad

Chapel Street This street will be widened and reconstructed from Raymond Boulevard to Lister Avenue The present 40 foot pavement on a 66-foot right-of-way will be improved to a 68-foot pavement on an 80 foot right of way The existing pavement is badly deteriorated and will require complete reconstruction

Road D This proposed road will extend along the south side of New York Branch Central Railroad from the New Jersey Turnpike to Doremus Avenue The proposed width of right of way is 60 feet and the pavement width is 44 feet

Delancy Street The existing section of this road from the Passaic Branch of the Lehigh Valley Railroad to the Elizabeth Branch Central Railroad consists of a 60-foot right-of-way and a 42-foot pavement The road will be completely reconstructed to a new 68-foot width on an 80-foot right-of-way A completely new section of this same width will extend from the Elizabeth Branch Central Railroad to Doremus Ave

To provide for the through traffic of Delancy Street from the central district of Newark into the project area, a structure under Passaic Branch Railroad and a structure over Elizabeth Branch Central Railroad are proposed An underpass already exists under the New Jersey Turnpike

Doremus Avenue This Avenue extends along the east boundary of the project. From the Lehigh Valley Railroad to Wilson Avenue it is a 39-foot pavement on a 75-foot right-of-way. From Wilson Avenue north to the Route 1 Ramp it has a 75-foot right-of-way and a 30-foot pavement. Complete reconstruction of the Avenue is necessary because of the deteriorated condition of the pavement and the poor grade. The proposed new construction will provide a 64-foot pavement on a 75-foot right of way. An additional structure must be provided over the Lehigh Valley and the New York Bay Railroads to provide adequate traffic capacity, and the existing structure will require extensive repairs.

Foundry Street It is proposed to widen this street between Route 1 and the New Jersey Turnpike by 14 feet. It will then have a 44-foot pavement and a 60-foot right of way. The existing road has a 30-foot pavement width on a 50-foot right-of-way. From the Turnpike to Avenue P the road will be widened by 8 feet to these same new widths. The widening is proposed along the north side of the Street and the total pavement section will receive a new surface.

Avenue K This street from Wilson Avenue south will be widened 4 feet on the existing right of way. The existing pavement is 40 feet wide. The entire pavement will be resurfaced.

Avenue L This is a proposed new section of road to extend from Wilson Avenue to Avenue K. It will have a 44-foot pavement width and a 60-foot right-of-way.

Lister Avenue The section of this street from Chapel Street to just east of Lockwood Street is now in a poor and deteriorating condition and will be reconstructed from a 40-foot pavement on a 66-foot right of-way to a 68-foot pavement on an 80-foot right-of-way. A new section of this improved width will extend from just east of Lockwood Street to Doremus Avenue. A structure will be required under Passaic Branch of New York Bay Railroad.

A portion of the new section of Lister Avenue will be built outside the project area to complete its connection with Doremus Avenue. This is necessary to provide complete and smooth circulation of traffic.

Magazine Street The section of this street from Route 1 to Avenue L will be widened from a 36-foot pavement to a 44-foot pavement, the existing right-of-way of 60 feet will be maintained.

Margaretta Street This street will be widened from Amsterdam Street to Avenue L and then extended to Wilson Avenue. The widening will vary to allow flexibility for traffic going west on Wilson Avenue to avoid the traffic congestion at its intersection with Stockton Street.

Morris Canal Bed Road This is a proposed new road which will have a 44-foot pavement on a 60-foot right-of-way. When this road is built Raymond Boulevard will become one-way east and this road will be the one-way west route.

A structure will be required under the Central Railroad of New Jersey. The grade under the railroad will be lower than elevation 10 to allow for adequate clearance, thus a drainage system must be provided to handle the surface runoff.

Avenue P The section of this road will be new construction from the New York Branch of the Central Railroad to Wilson Avenue. It will also be relocated from the existing designated right-of-way to give the property between it and the New Jersey Turnpike more depth.

The existing route is now a dirt road, except about 300 feet south and about 1100 feet north of the New York Branch Central Railroad. The northern portion of the road will remain as is. The 300-foot section south from the railroad will require reconstruction because of its deteriorated condition and to meet the grades of the new section.

Raymond Boulevard The section of this street from Blanchard Street to Freeman Street will be widened from a 40-foot pavement to a 44-foot pavement. The widening will be on the north side, and a surface course will be placed over the entire pavement width. When Morris Canal Bed Road is constructed this street will be one-way for eastbound traffic.

Roanoke Avenue This street from Foundry Street to Manufacturers Branch Central Railroad will be widened from a 36-foot pavement to a 44-foot pavement. The right of-way will remain at 60 feet. A surface course will be placed over the entire road section.

Wilson Avenue This street from Doremus Avenue to State Highway 1 will require complete reconstruction. The existing road is now a 30 to 40-foot pavement and the right of way varies from 66 feet to 70 feet.

The proposed reconstructed road will have a 68-foot pavement section and an 80-foot right-of-way. An additional structure is proposed parallel to the existing structure over the Elizabeth Branch of Central Railroad to provide the required traffic capacity.

Storm Drain System Improvements: Lack of significant storm drain facilities is one of the basic shortcomings of the project area. Some drains do exist in isolated parts of the project area, but these outfall into the project area, so little overall is accomplished. The drainage facilities along the regional transportation facilities generally merely discharge into the project area.

The drainage that now exists consists of a number of meandering ditches which appear to have developed over the years without any specific plan. They have inadequate capacity and are not protected by right-of-way easements. There is also mixing of the storm and sanitary sewer discharges.

The flooding problem has been previously discussed. Its solution is necessary for attainment of all the goals and objectives spelled out in the urban

Typical illustration of street in need of repair or replacement

Bridge in need of improvement

Doremus Avenue will require reconstruction

renewal plan. It is a major cause of blight in the area and its correction is a basic necessity.

Establishment of a minimum ground surface elevation of +10.0 for the project area, as has been previously discussed, would enable an effective storm drain system to be planned and designed. Drawing No. 9G – Storm Sewer System illustrates the various features of the proposed storm sewer system for the Project.

It will be noted that the system consists largely of asbestos-bound, corrugated metal pipe arches with paved inverts. The asbestos coating is to protect the pipe from industrial waste corrosion. The pipe-arch shape was adopted to provide needed flow capacity with the restrictions of limited grade. This is the only deviation from the City of Newark standard practice, where use of circular concrete pipe for storm drains is the general practice.

Sanitary Sewer System Improvements: Improvements and extensions of the existing system are proposed to provide the entire area when fully developed with an adequate disposal system. The Passaic Valley Sewage Treatment plant is located in the southeast portion of the project area. With its present facilities and planned additions it has adequate capacity for the increased project sewer flow. The only problem is to provide adequate trunk line and lateral capacity for the project area.

Drawing No. 9H shows the extensions, improvements, and additions proposed for the project. This system is planned to adequately serve the area for the full proposed industrial development.

Water Distribution System Improvements: An adequate water supply is available through the water utility serving the area with its present facilities and definite plans to meet future needs. The existing water mains and the proposed additions, extensions and improvements are shown on Drawing No. 9I.

The City of Newark, Department of Public Works, Division of Water Supply, which serves the area, does not anticipate any difficulty in providing fully for any water requirements that the project in its complete development may generate.

Costs of Project Improvements: The estimated total cost of all project improvements is $14,500,000. About thirteen and one/half million of this represents costs for street (including traffic control facilities), storm drains, water, and sewer system improvements. Preliminary design and cost estimates for these improvements appear in this report.

Power, gas and telephone services are supplied by private utility companies. Costs for which these companies will require compensation are those removals and relocations directly caused by the Urban Renewal Plan. The Public Service Electric & Gas Company estimates that for the power distribution system such costs will amount to approximately $700,000, of which about one/half is a direct result of a major power generating unit, the Essex Substation, being located within the project area. The Company further estimates that changes in its gas distribution system will cost $125,000. The New Jersey Bell Telephone Company sets the re-imbursable costs of the necessary changes in its system at about $110,000.

Water and Sewer Systems to be Improved and Extended

The Project

The Industrial River Urban Renewal Project involves the development, renewal, and rehabilitation of approximately 1700 acres of land on the eastern edge of the City of Newark. The project is under the direction and control of the Housing Authority which is the Redevelopment Agency for the City of Newark; and it is federally sponsored by the Urban Renewal Administration of the Housing and Home Finance Agency under the Housing and Urban Development Act of 1965 (Housing Act of 1949, as Amended). The Passaic River bounds the area on the north; Doremus Avenue on the east; the Pennsylvania Railroad line, Pulaski Skyway and Raymond Boulevard on the west; and the Pennsylvania and Lehigh Valley Railroad yards and tracks on the south.

The project is considered to be prime industrial land because of its central location in the metropolitan area; the large labor market—professional, skilled and unskilled—that it can freely draw upon; its strategic location as a central assembly and distribution hub for the metropolitan market area and the whole eastern seaboard; and the complete utility service and transportation facilities available.

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